

## A BIRD CENSUS METHOD

BY W. J. BRECKENRIDGE

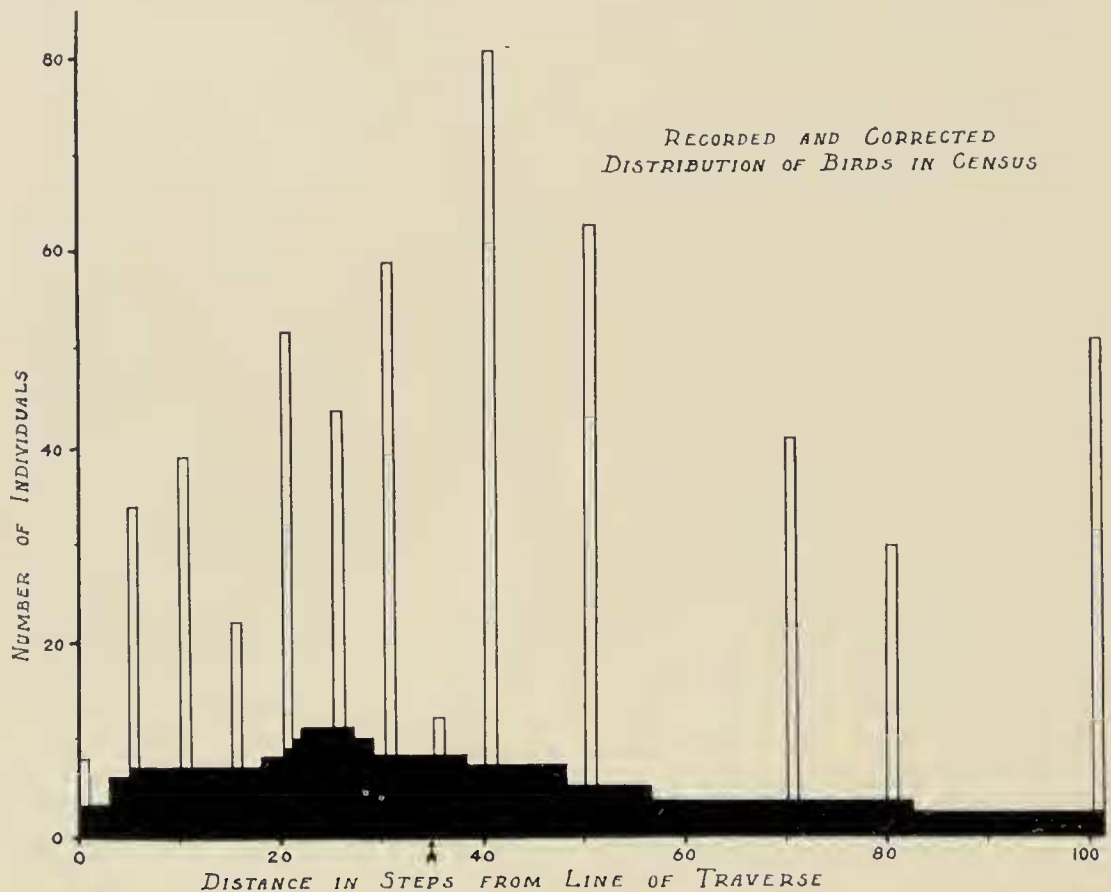
During the course of an ecological study of the Marsh Wrens in a limited area in eastern Minnesota, the writer found it desirable to ascertain something regarding the populations of other birds breeding on the same area. Numerous census methods have been described by other workers. Most of these have been devised to indicate relative densities of populations for different areas or periods and were not applicable to the present study. Others have attempted to determine actual populations of limited areas, but their methods, while workable perhaps for very small tracts, could not be applied successfully to areas of a square mile in extent, the size of the tract in the present study.

The square mile on which this census was taken lay in very slightly rolling country. The ridges were covered by a sparse timber growth, the depressions were grown up to sedges and bluegrass, while the narrow belt between these two supported short willow and dogwood brush. These vegetative types appeared in irregular, narrow strips or isolated patches so intermingled as to be impossible of separate study in regard to avian populations. The following paragraphs describe the method used in this mixed type of vegetative cover and include some results from this particular census.

The observer (the writer worked alone in this study) traversing the section along compass lines, identified each individual bird, as far as was possible, as it was encountered and recorded the species and the approximate distance in steps (2,000 of the writer's equaled one mile) from the compass line from which it was seen. The section was thus crossed four times along parallel lines separated from each other by at least three hundred and fifty steps. This avoided the possibility of counting the same individuals twice. By following compass lines the observer avoided favoring or neglecting any one type of cover. These traverses were made during the morning and evening hours when the birds were most active. In the present study one census was made along north-south lines while a checking census was made along east-west lines a week later.

The securing of the total population was the primary object in the present study. In order to obtain this, the total number of birds flushed at each of the indicated distances from the compass line was determined and plotted as one of the open bars in the accompanying figure. It was assumed that some error occurred in estimating these distances. For those recorded as flushed at ten steps, for instance, the

actual distance probably varied between seven and thirteen steps, and for those recorded at forty steps the distance varied perhaps from thirty-two to forty-eight steps. Accordingly these errors were corrected by distributing the records over those ranges and the result, appearing in the figure as the shaded portion, presented a fairly accurate picture of the actual distribution of the birds flushed. From this picture it appears that few birds were flushed directly on the line and that the number increased as the distance from the line increased



up to twenty-five steps where they dropped again to a level and then began to show a definite decrease between thirty-five and forty steps. The explanation for this was that a portion of the birds occurring on the line of traverse moved outward in the vegetation and appeared a short distance on either side of the line. Then, allowing for this movement, it is seen that the maximum flushing per step from the line occurred equally out to about thirty-seven steps where a decrease began. Therefore one may safely assume that *at least* the number of birds flushed within the thirty-five step line (two hundred and seventy in this case) would be encountered on every strip seventy steps wide (thirty-five on either side of the line) and four miles long throughout the section. On this basis the *minimum* population for this particular

mile proved to have been 1,929 birds or 3.01 birds per acre. This would necessarily be somewhat under the actual number present as one man crossing the area would not record every individual bird on a strip seventy steps wide. A number of individuals walking close together might materially reduce the error from this source. Strangely enough, due to the above mentioned outward movement of the birds before flushing, calculations based on those seen on a very narrow strip, e. g., twenty steps in this case, produced a smaller total than those using the wider strip. No way of determining just what percentage of the actual population these figures represent is known, therefore the results arrived at in the above manner must be taken as *minimum* populations.

Information regarding the actual and relative abundance of the more common species was also secured from the above mentioned data. Figures similar to the one constructed for the total population were drawn up for the more abundant species separately. Here the same scarcity of records on the line with an increase outward was evident. A limit was set in each case beyond which the records began to definitely decrease. The number of birds was determined within this limit and from this the species totals for the square mile were calculated. In the case of those species other than the very abundant ones where comparatively few individuals were encountered on four miles of traverse, numbers thus calculated would usually be rather inaccurate. Accordingly the results thus arrived at in this case were considered comparatively dependable only for the five most abundant out of the sixty-seven species found nesting on the tract. The totals for these five species follow:

1. Clay-colored Sparrow .....	540
2. Song Sparrow .....	227
3. Yellow Warbler .....	212
4. Catbird .....	143
5. Northern Yellowthroat .....	140

This method of determining actual bird populations, like all other methods, is open to criticism at various points. However, it is here presented as being considerably more accurate than mere estimates would be, and as producing numerical results which may be depended upon not to be in excess of the actual populations but which are in all probability a small percentage under the actual numbers of birds present on any areas so studied.

UNIVERSITY OF MINNESOTA,  
NATURAL HISTORY MUSEUM AND DEPARTMENT OF ZOOLOGY,  
MINNEAPOLIS, MINNESOTA.